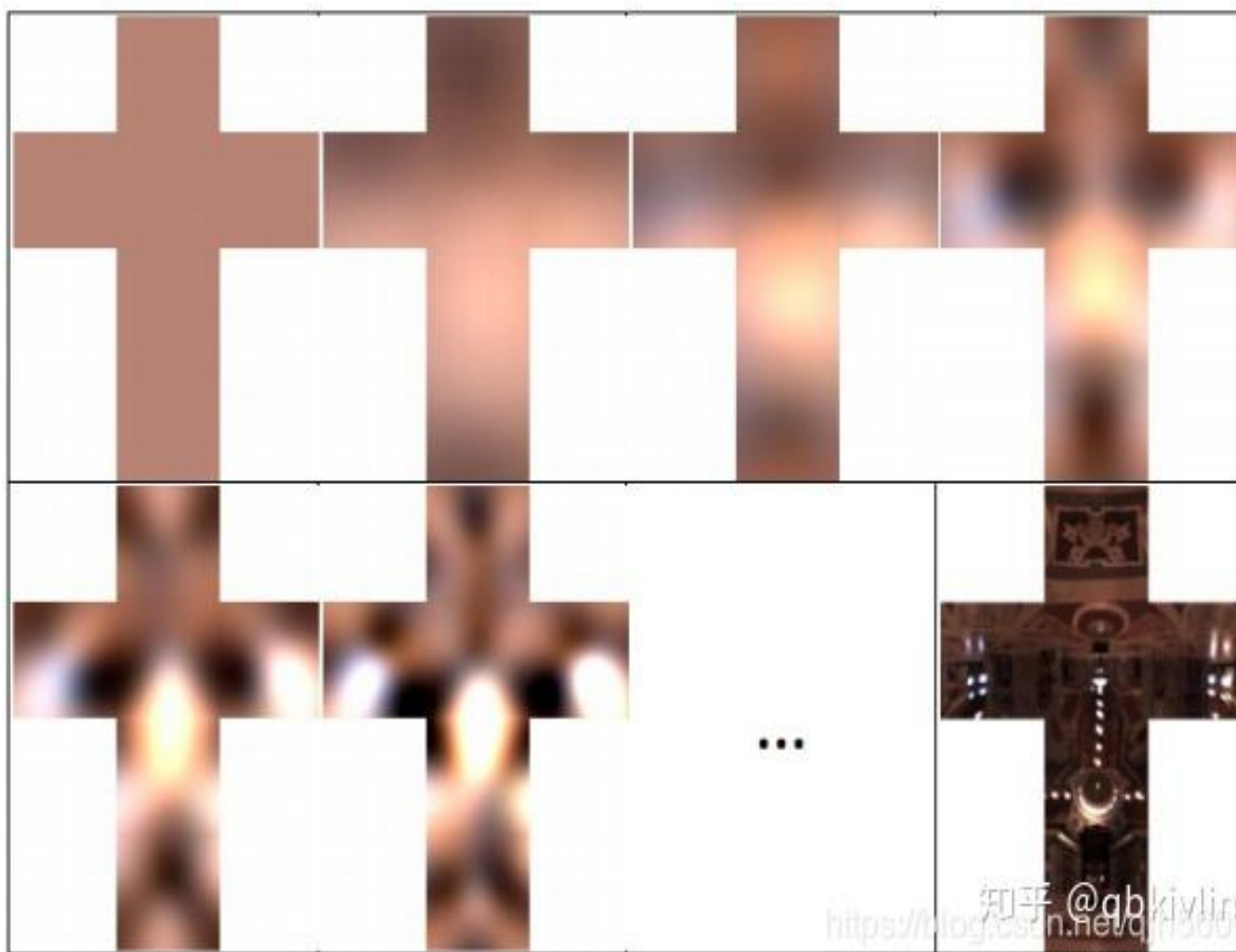


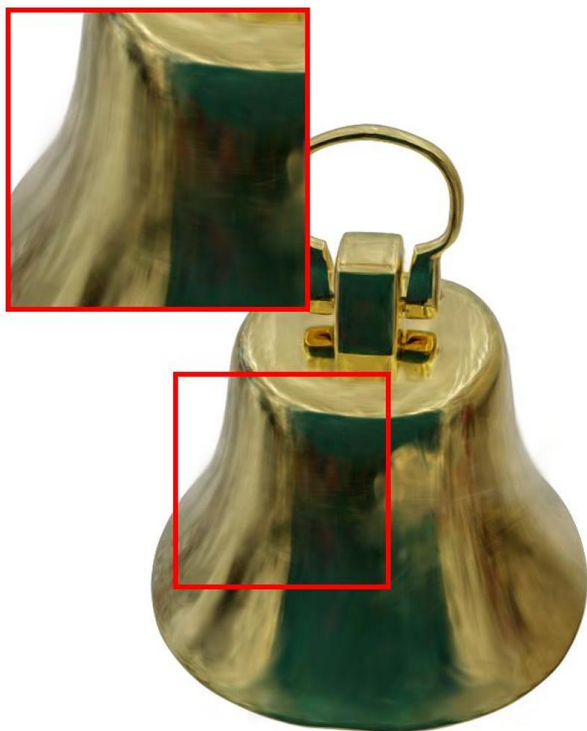
Refective Gaussian Splatting

■ Limitation of 3D Reconstruction on reflective scene:

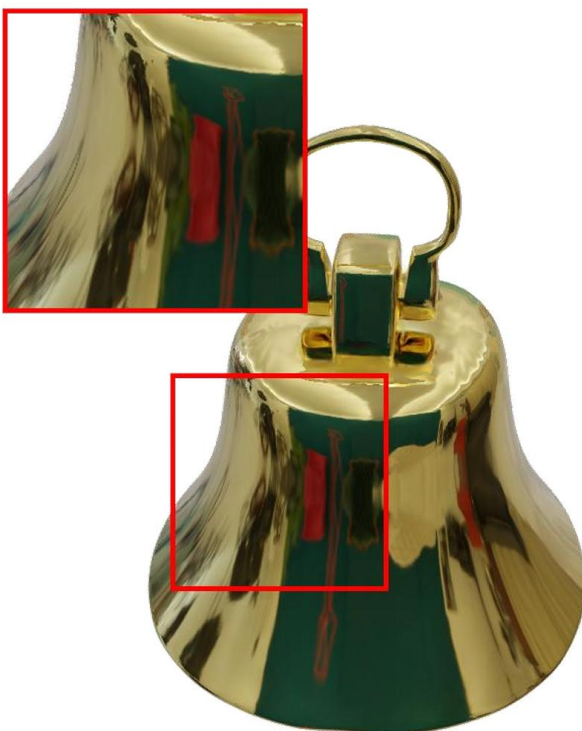


■ Limitation of 3D Reconstruction on reflective scene:

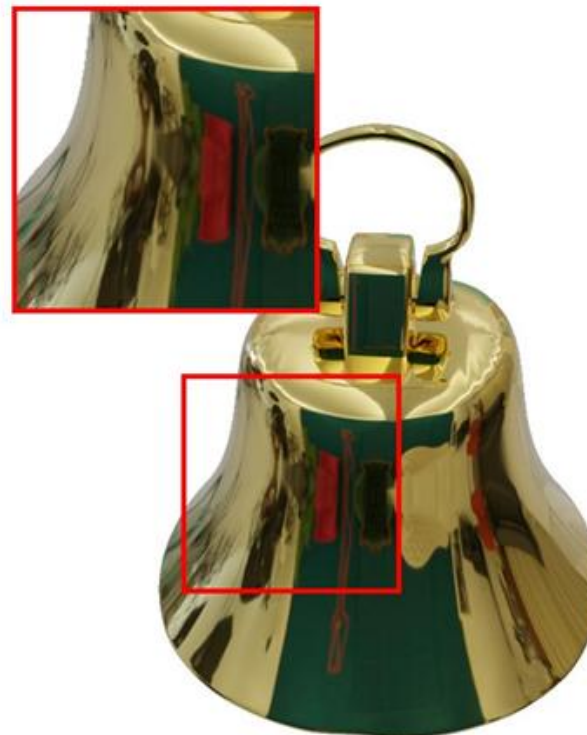
3DGS
PSNR:25.11



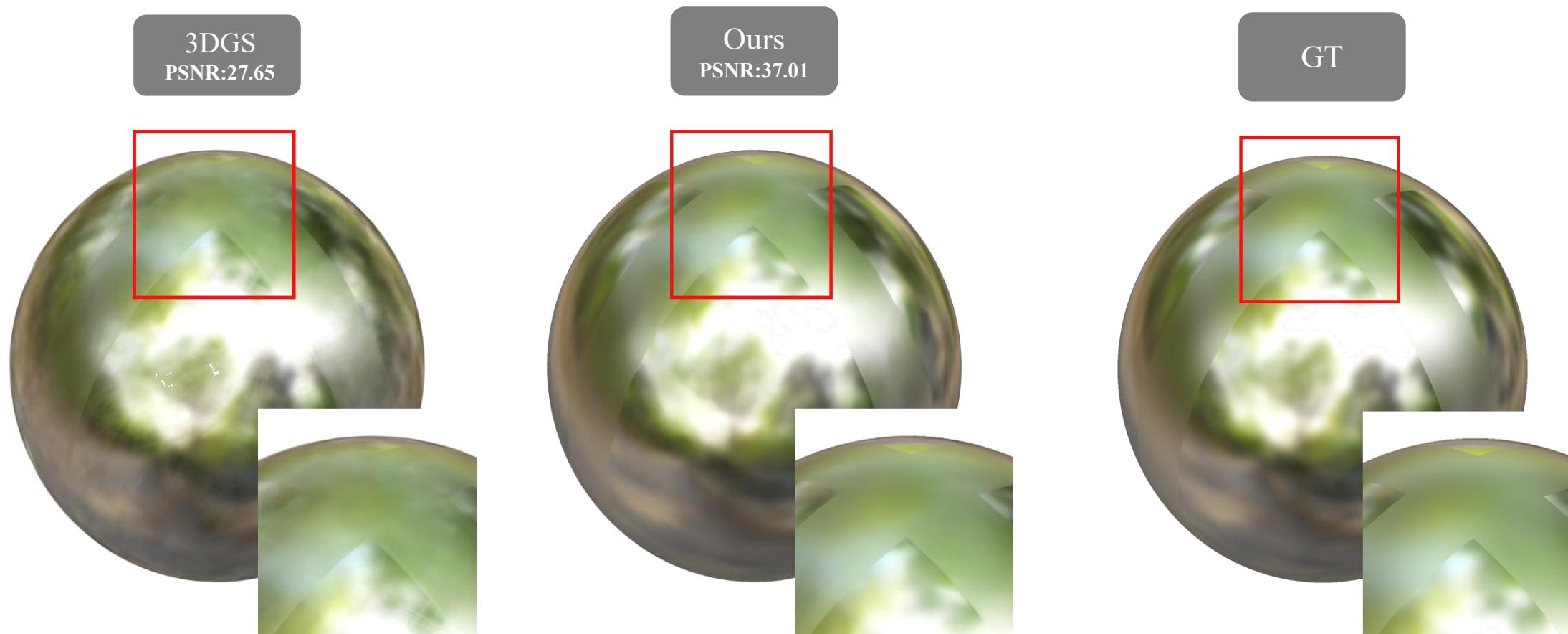
Ours
PSNR:32.86



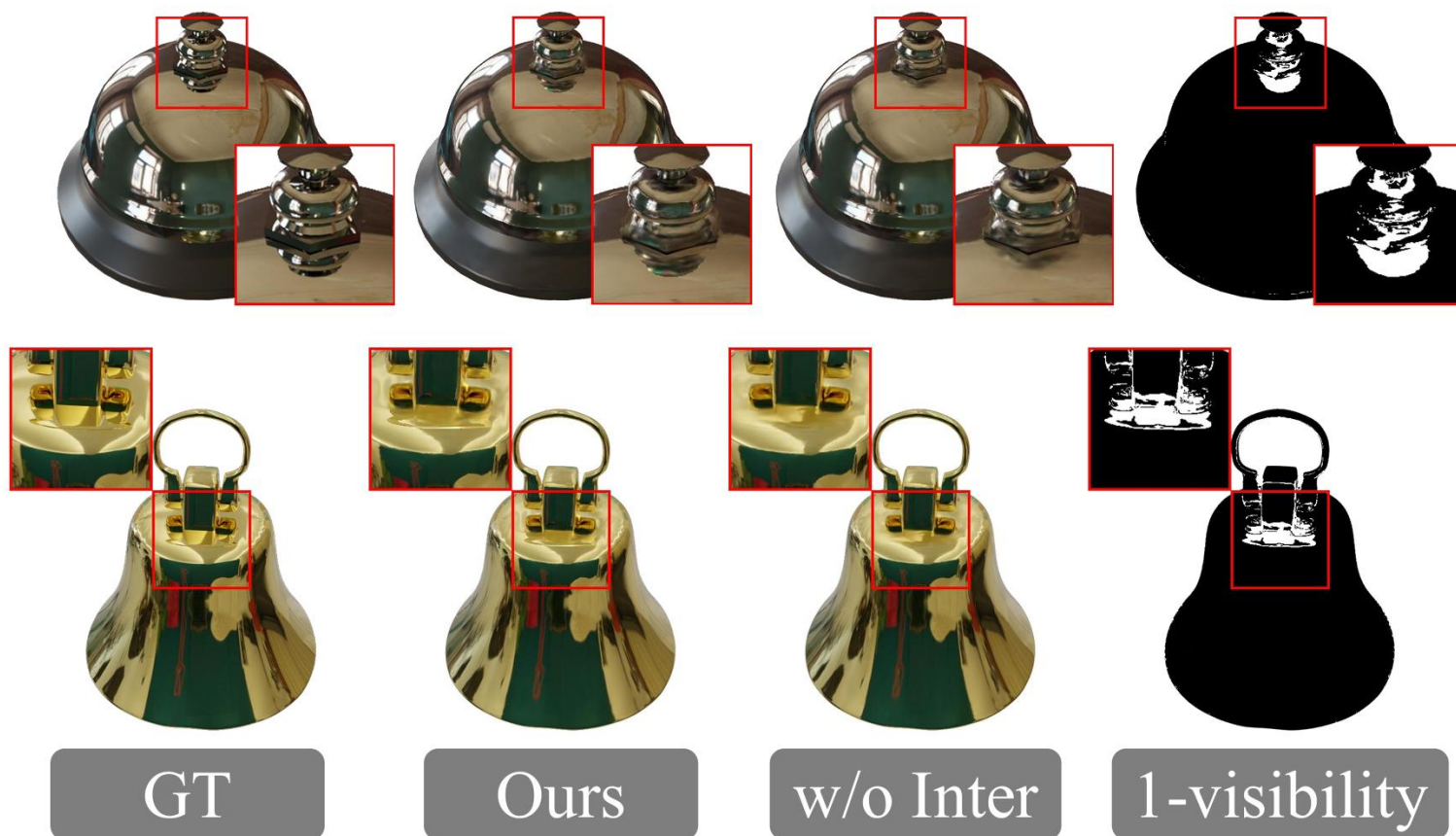
GT



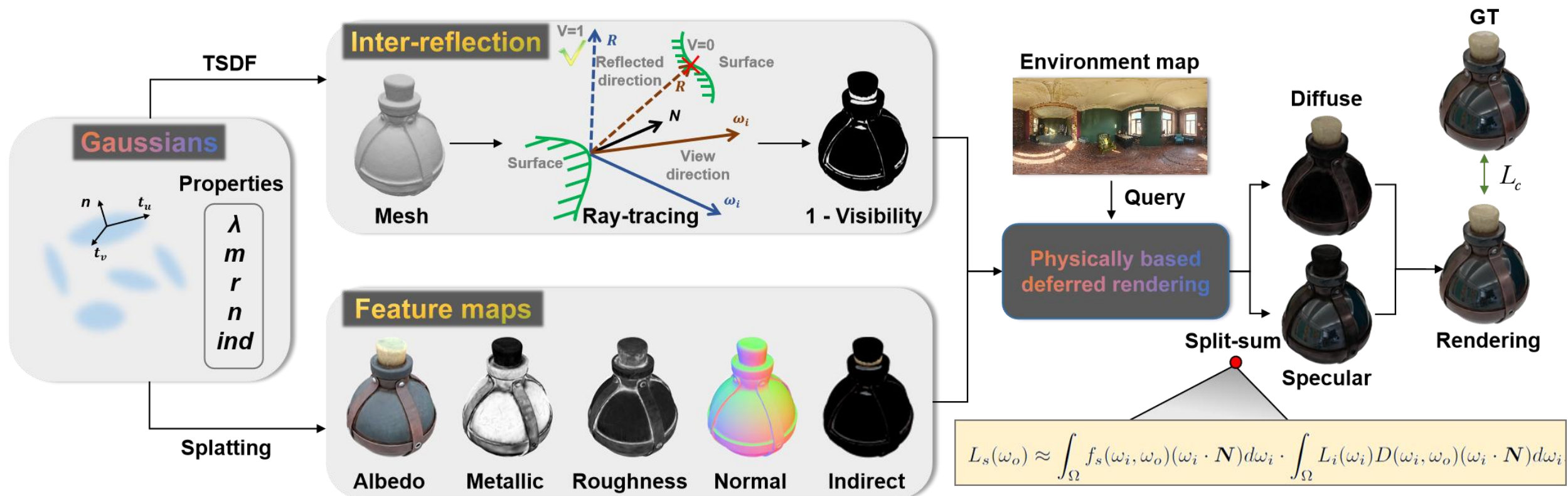
■ Limitation of 3D Reconstruction on reflective scene:



■ Limitation of 3D Reconstruction on inter-reflection:

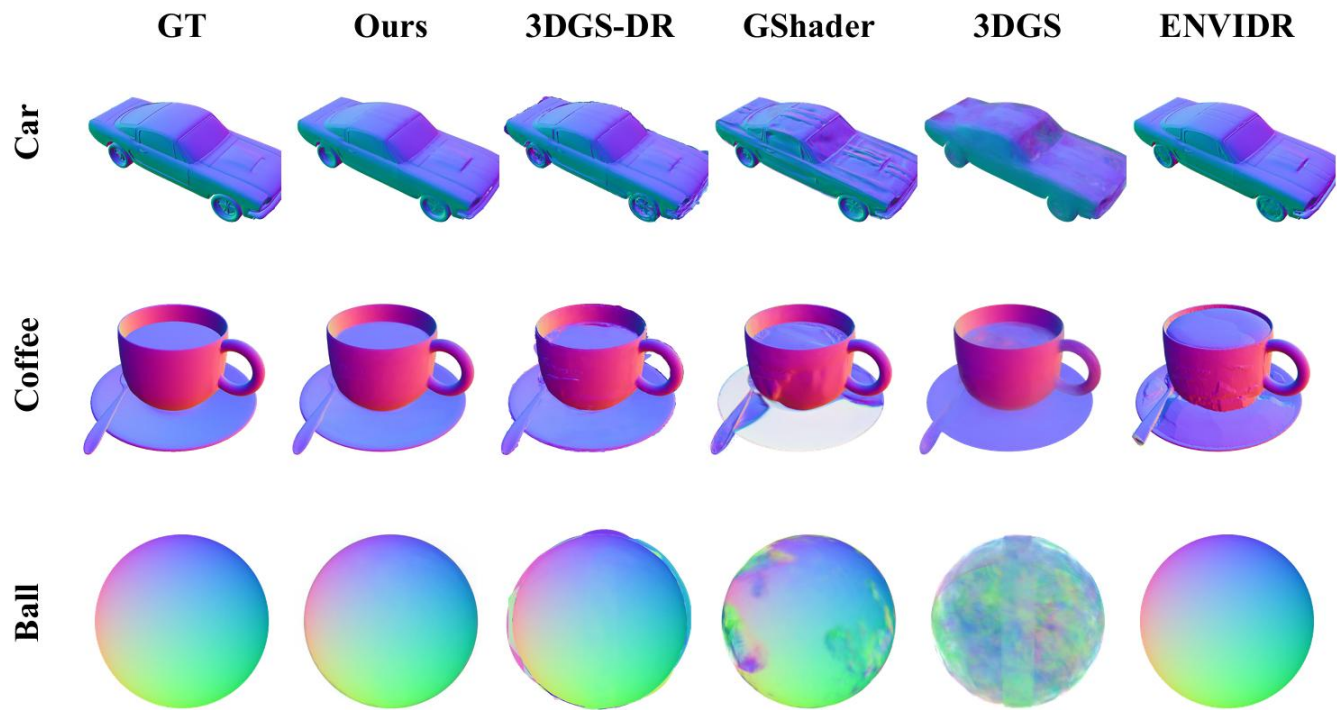


Our method:



ICLR 2025: Reflective Gaussian Splatting

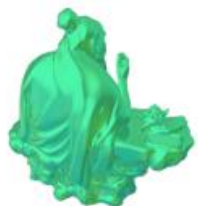
Datasets	Shiny Blender Verbin et al., 2022						Glossy Synthetic Liu et al., 2023								Real Verbin et al., 2022		
Scenes	ball	car	coffee	helmet	teapot	toaster	angel	bell	cat	horse	luyu	potion	tbell	teapot	garden	sedan	toycar
PSNR $\uparrow$																	
Ref-NeRF	33.16	30.44	33.99	29.94	45.12	26.12	20.89	30.02	29.76	19.30	25.42	30.11	26.91	22.77	22.01	25.21	23.65
ENVIDR	41.02	27.81	30.57	32.71	42.62	26.03	29.02	30.88	31.04	25.99	28.03	32.11	28.64	26.77	21.47	24.61	22.92
3DGS	27.65	27.26	32.30	28.22	45.71	20.99	24.49	25.11	31.36	24.63	26.97	30.16	23.88	21.51	21.75	26.03	23.78
2DGS	25.97	26.38	32.31	27.42	44.97	20.42	26.95	24.79	30.65	25.18	26.89	29.50	23.28	21.29	22.53	26.23	23.70
GShader	30.99	27.96	32.39	28.32	45.86	26.28	25.08	28.07	31.81	26.56	27.18	30.09	24.48	23.58	21.74	24.89	23.76
R3DG	23.64	25.92	30.10	25.01	43.15	18.80	24.90	23.51	27.59	23.37	24.68	27.29	21.25	20.47	21.92	21.18	22.83
3DGS-DR	33.43	30.48	34.53	31.44	47.04	26.76	29.07	30.60	32.59	26.17	28.96	32.65	29.03	25.77	21.82	26.32	23.83
Ref-Gaussian	37.01	31.04	34.63	32.32	47.16	28.05	30.38	32.86	33.01	27.05	30.04	33.07	29.84	26.68	22.97	26.60	24.27
SSIM $\uparrow$																	
Ref-NeRF	0.971	0.950	0.972	0.954	0.995	0.921	0.853	0.941	0.944	0.820	0.901	0.933	0.947	0.897	0.584	0.720	0.633
ENVIDR	0.997	0.943	0.962	0.987	0.995	0.922	0.934	0.954	0.965	0.925	0.931	0.960	0.947	0.957	0.561	0.707	0.549
3DGS	0.937	0.931	0.972	0.951	0.996	0.894	0.792	0.908	0.959	0.797	0.916	0.938	0.900	0.881	0.571	0.771	0.637
2DGS	0.934	0.930	0.972	0.953	0.997	0.892	0.918	0.911	0.958	0.909	0.918	0.939	0.902	0.886	0.609	0.778	0.597
GShader	0.966	0.932	0.971	0.951	0.996	0.929	0.914	0.919	0.961	0.933	0.914	0.936	0.898	0.901	0.576	0.728	0.637
R3DG	0.888	0.922	0.963	0.931	0.995	0.858	0.894	0.888	0.934	0.878	0.889	0.911	0.875	0.869	0.556	0.643	0.657
3DGS-DR	0.979	0.963	0.976	0.971	0.997	0.942	0.942	0.959	0.973	0.933	0.943	0.959	0.958	0.942	0.581	0.773	0.639
Ref-Gaussian	0.981	0.964	0.976	0.971	0.998	0.948	0.954	0.969	0.973	0.944	0.952	0.963	0.962	0.947	0.617	0.777	0.660
LPIPS $\downarrow$																	
Ref-NeRF	0.166	0.050	0.082	0.086	0.012	0.083	0.144	0.102	0.104	0.155	0.098	0.084	0.114	0.098	0.251	0.234	0.231
ENVIDR	0.020	0.046	0.083	0.036	0.009	0.081	0.067	0.054	0.049	0.065	0.059	0.072	0.069	0.041	0.263	0.387	0.345
3DGS	0.162	0.047	0.079	0.081	0.008	0.125	0.088	0.104	0.062	0.077	0.064	0.093	0.102	0.125	0.248	0.206	0.237
2DGS	0.156	0.052	0.079	0.079	0.008	0.127	0.072	0.109	0.060	0.071	0.066	0.097	0.125	0.101	0.254	0.225	0.396
GShader	0.121	0.044	0.078	0.074	0.007	0.079	0.082	0.098	0.056	0.562	0.064	0.088	0.091	0.122	0.274	0.259	0.239
R3DG	0.214	0.058	0.090	0.125	0.013	0.170	0.085	0.125	0.089	0.081	0.080	0.117	0.156	0.115	0.354	0.380	0.312
3DGS-DR	0.105	0.033	0.076	0.050	0.006	0.082	0.052	0.050	0.042	0.057	0.048	0.068	0.059	0.060	0.247	0.208	0.231
Ref-Gaussian	0.098	0.033	0.076	0.049	0.006	0.074	0.042	0.040	0.040	0.048	0.043	0.064	0.058	0.058	0.256	0.245	0.256



Model	Normal			Envmap	Efficiency	
	MAE↓	SSIM↑	LPIPS↓	LPIPS↓	Training time (h)↓	FPS↑
ENVIDR (Liang et al. 2023)	2.74	0.948	0.0728	0.5099	5.84	1
GShader (Jiang et al. 2024)	7.00	0.931	0.1109	0.6145	0.48	28
3DGS-DR (Ye et al. 2024)	2.62	0.947	0.0645	0.5290	0.35	251
<i>Ref-Gaussian</i>	2.15	0.954	0.0511	0.4431	0.58	122

Editing / GT

Luyu



Teapot



Relighting

